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METHOD FOR REDIRECTING THE SOURCE OF A DATA OBJECT DISPLAYED IN AN HTML DOCUMENT

CROSS REFERENCE TO RELATED APPLICATIONS

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This application claims priority to provisional patent application Serial No. 60/220,236, filed July 21, 2000 entitled, "Method for Redirecting the Source of a Data Object Displayed in an HTML Document."

20 TECHNICAL FIELD

The invention generally relates to redirecting an application program to the source of an HTML object that is stored in an alternative source file, and more specifically relates to embedding a redirection tag within an HTML data object that points to the underlying source of the
25 HTML data object stored in an alternative source file.

BACKGROUND

The file format known as "Hypertext Markup Language" (HTML), which is used for developing Web pages, is optimized for displaying data

objects and not describing the underlying data format associated with the data object. Therefore, even though the data object is visible to the user in the Web page, application programs that wish to make use of the data object displayed on the Web page may have trouble interpreting the data.

5 This is due to the fact that application programs are unable to interpret the context of how data is used in a Web page because HTML does not define the “data type” of the data objects. For example, a character string may be displayed in an HTML document as “3-9-00.” The character string may represent a number, a date, an identification number, or a part
10 of a larger number within the document. Because the character string is stored in HTML format in the Web page, the application program in which the character string is to be imported may not be able to interpret the character string correctly. For instance, if the character string is imported into a spreadsheet program, the spreadsheet program may
15 interpret the character string “3-9-00” as a date, when the character string may actually be an identification number. Therefore, the meaning of the data would be misinterpreted by the spreadsheet program, which may lead to a result that is different from what the user expects.

Another problem encountered with importing data from an HTML
20 document into an application program is that the information displayed in the HTML document may only be a subset of the actual data. Typically, the Internet’s bandwidth and response time limit the amount of data that may be transferred at any given time. Therefore, large amounts of data may be broken down into smaller subsets, or “pages” of data to be
25 downloaded separately. For example, suppose a user wishes to search the Internet for all sites that include information about snow skiing. When the search is complete, the number of “hits,” or sites relating to snow skiing that the search uncovered may be too large to present to the user at one time on a single Web page. Therefore, the results of the search may

be stored at a remote server. The search results would then be parsed into multiple “pages,” with each page containing a predefined number of sites. The “pages” may then be displayed one at a time to the user. However, if the user wanted to import the entire search results into an application
5 program, such as a spreadsheet or database, the user would typically have to load each page individually and save the contents separately. Depending on the size of the search results, this process would be tedious and time consuming, which can lead to errors and frustration on the part of the user.

10 Thus, there is a general need in the art for an improvement to the HTML file structure to allow data objects in an HTML document to be imported into application programs, such that the original context, or data type, of the data object is preserved. There is a still a further need in the art for a method of redirecting application programs to an alternative
15 location to retrieve the underlying data associated with the data objects displayed in the HTML document.

SUMMARY OF THE INVENTION

Generally described, the invention meets the above-described
20 needs by providing a custom attribute that is added to the standard HTML file format. The custom attribute redirects an application program to an alternative location where the underlying data associated with a data object displayed on the Web page is stored. The custom attribute comprises a redirection attribute. The redirection attribute is placed
25 within a specific HTML data object tag. The redirection attribute indicates that the data object tag has associated underlying data stored at an alternative location. The redirection attribute contains a connection string, or URL, that points to the alternative location where the underlying data is stored.

More specifically, the invention also describes a method of redirecting an application program to an alternative location to retrieve at least one data object stored at the alternative location in an alternative source file. First, a user command is received, selecting at least one data
5 object that is displayed in the HTML document to be imported into the application program. Next, the data object tag associated with the data object that the user specified to import is retrieved. The data object tag is then examined to determine whether the redirection attribute exists. If the redirection attribute exists, it is retrieved. The connection string that
10 points to the alternative location where the data object is stored is retrieved from the redirection attribute and the alternative location is accessed. Next, the underlying data associated with the data object and stored in an alternative file format is retrieved from the alternative site and imported into the application program. However, if the data object
15 tag does not contain the redirection attribute, then the data object displayed in the HTML document is imported directly into the application program.

The invention may also determine whether more than one instance of tabular data is selected. If more than one instance of tabular data is
20 selected, then the redirection attribute is ignored and the data is imported directly from the HTML document in the HTML file format. However, if only one instance of tabular data is selected then the HTML tag is retrieved and the determination is made whether the redirection attribute is present. It should be noted that limiting the redirection tag to import
25 only a single instance of tabular data is due to the limitation of the MICROSOFT EXCEL spreadsheet program. Currently, the MICROSOFT EXCEL spreadsheet program does not have the ability to import multiple instances of data from an alternate source into a single worksheet. The invention has the ability to import data from the source

instead of the HTML document, no matter how many objects are selected.

Yet another aspect of the invention is to determine whether the redirection attribute has been disabled. If the redirection attribute has not been disabled, then the connection string is retrieved and the alternative location is opened. However, if the data object tag does not contain the connection string or the redirection attribute is disabled, then the data object displayed in the HTML document is imported directly into the application program in HTML format.

That the invention improves over the drawbacks of the current HTML file structure to allow data objects in an HTML document to be imported into application programs, such that the original file format, or data type of the data object is preserved and provides a method for redirecting an application to an alternative source file that contains the underlying data displayed in the HTML document and accomplishes the advantages described above will become apparent from the following detailed description of the exemplary embodiments and the appended drawings and claims.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is block diagram of a personal computer that provides the operating environment for an embodiment of the invention.

FIG. 2 is a block diagram of a file structure of an HTML document implementing the redirection tag.

FIG. 3 is a screen shot illustrating a dialog box that enable a user to disable the redirection tag.

FIG. 4 is a logic flow diagram illustrating an exemplary method to implement the redirection tag.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

The invention is a method for Web authors to include a custom attribute in an HTML document that redirects an application program to an alternative location that stores the underlying data in an alternative source file associated with a data object displayed on the Web page. In one embodiment, the invention is incorporated into a suite of computer application programs such as the MICROSOFT OFFICE XP application suite, marketed by Microsoft Corporation of Redmond, Washington. Briefly described, this invention includes an improvement to the standard HTML file format that allows Web authors to add a redirection attribute to data objects on their Web pages.

Generally described, the redirection attribute is used when the Web author creates a Web page containing a data object in HTML format with a redirection to an alternative source for the underlying data associated with the data object. The Web author's motivation for redirecting to an alternative site is that the end user (i.e., the person viewing the Web page) will want to analyze the data in an application program differently than a Web browser program. The redirection attribute "routes" the application program to an alternative location where the underlying data is stored and returns that same information displayed by the HTML data object, but in a file format that is optimized for data semantics.

One common implementation of the redirection attribute is for a Web Query in a spreadsheet program. Typically, data objects are stored in HTML format in a Web browser application program. However, when a user creates a Web Query they generally want to import the data in the format that is optimized for use in the spreadsheet program (i.e., the MICROSOFT EXCEL spreadsheet program). Therefore, the redirection tag "redirects" the spreadsheet program to the alternative site where the

underlying data is stored in a robust format, such as Extensible Markup Language (XML). The spreadsheet program can then import the underlying data rather than the data object in HTML form to create the Web Query. The end-user is unaware that any redirection has taken
5 place.

However, before a redirection tag can be used, the HTML document must be modified. Generally, an HTML file includes a hierarchical set of markup elements. Most markup elements include a start tag, followed by content, followed by an end tag. The content is
10 typically a combination of text and nested markup elements. Tags, which are enclosed in angle brackets ('<' and '>'), indicate the file structure and the format of the object data. There are tags for markup elements such as titles and headers, for tabular data, for text attributes such as bold and italic, for lists, for paragraph boundaries, for links to other documents or
15 other parts of the same document, for graphic images, for non-displayed comments, and for many other features.

Typically, Web authors modify the HTML at the time the HTML document is created. Specifically, Web authors must add a namespace to the HTML tag and a redirection attribute to each object data tag in the
20 HTML document whose underlying data is stored at an alternative location. As an example, to create a Web Query that redirects the application program to the underlying source of the tabular data, Web authors need to add the following MICROSOFT OFFICE namespace declaration to the HTML tag of the HTML document:

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<HTML xmlns:o="urn:schemas-microsoft-com:office:office">
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which associates the namespace name "urn:schemas-microsoft-com:office:office" with the prefix "o."

Next, later on in the <TABLE> tag in the BODY hierarchy of the HTML document, Web authors must include a redirection attribute to the data object tag whose underlying data is stored at an alternative location. The redirection attribute contains a connection string, which is a pointer to the location where the underlying data is stored. Typically, the connection string is a Uniform Resource Locator (“URL”). However, the connection string may be any data string that provides an address to the location of the underlying data and information on how to retrieve the underlying data. Using the Web Query as an example, Web authors must include within the <TABLE> tag the following redirection attribute:

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<TABLE ... o:WebQuerySourceHRef="http://...">
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The “o” prefix indicates that “WebQuerySourceHRef” attribute’s namespace is “urn:schemas-microsoft-com:office:office,” which was previously defined in the <HTML> tag. Furthermore, the “WebQuerySourceHRef” attribute specifically identifies that the underlying source of the tabular data is stored at an alternative location. Specifically, the connection string “http://...” identifies the address of the alternative location where the underlying data is stored.

Adding redirection attributes to an HTML document enables an application program, such as the MICROSOFT EXCEL spreadsheet program, to correctly interpret the semantics of the data object the user has selected from an HTML document. Rather than retrieving a data object stored in HTML format, the MICROSOFT EXCEL spreadsheet program retrieves the underlying data stored in its original, rich format from the URL specified by the connection string.

Exemplary Operating Environment

FIG. 1 and the following discussion are intended to provide a brief, general description of a suitable data-computing environment in which the invention may be implemented. While the invention will be described in the general context of an application program that runs on an operating system in conjunction with a personal computer, those skilled in the art will recognize that the invention also may be implemented in combination with other program modules. Generally, program modules include routines, programs, components, data structures, etc. that perform particular tasks or implement particular abstract data types. Moreover, those skilled in the art will appreciate that the invention may be practiced with other computer system configurations, including hand-held devices, multiprocessor systems, microprocessor-based or programmable consumer electronics, minicomputers, mainframe computers, and the like. The invention may also be practiced in distributed computing environments where tasks are performed by remote processing devices that are linked through a communications network. In a distributed computing environment, program modules may be located in both local and remote memory storage devices.

With reference to FIG. 1, an exemplary system for implementing the invention includes a conventional personal computer **20**, including a processing unit **21**, a system memory **22**, and a system bus **23** that couples the system memory to the processing unit **21**. The system memory **22** includes read only memory (ROM) **24** and random access memory (RAM) **25**. A basic input/output system **26** (BIOS), containing the basic routines that help to transfer information between elements within the personal computer **20**, such as during start-up, is stored in ROM **24**. The personal computer **20** further includes a hard disk drive **27**, a magnetic disk drive **28**, e.g., to read from or write to a removable

disk 29, and an optical disk drive 30, e.g., for reading a CD-ROM disk 31 or to read from or write to other optical media. The hard disk drive 27, magnetic disk drive 28, and optical disk drive 30 are connected to the system bus 23 by a hard disk drive interface 32, a magnetic disk drive interface 33, and an optical drive interface 34, respectively. The drives and their associated computer-readable media provide nonvolatile storage for the personal computer 20. Although the description of computer-readable media above refers to a hard disk, a removable magnetic disk and a CD-ROM disk, it should be appreciated by those skilled in the art that other types of media which are readable by a computer, such as magnetic cassettes, flash memory cards, digital video disks, Bernoulli cartridges, and the like, may also be used in the exemplary operating environment.

A number of program modules may be stored in the drives and RAM 25, including an operating system 35, one or more application programs 36, other program modules 37, and program data 38. A user may enter commands and information into the personal computer 20 through a keyboard 40 and pointing device, such as a mouse 42. Other input devices (not shown) may include a microphone, joystick, game pad, satellite dish, scanner, or the like. These and other input devices are often connected to the processing unit 21 through a serial port interface 46 that is coupled to the system bus, but may be connected by other interfaces, such as a game port or a universal serial bus (USB). A monitor 47 or other type of display device is also connected to the system bus 23 via an interface, such as a video adapter 48. In addition to the monitor, personal computers typically include other peripheral output devices (not shown), such as speakers or printers.

The personal computer 20 may operate in a networked environment using logical connections to one or more remote computers,

such as a remote computer **49**. The remote computer **49** may be a server, a router, a peer device, or other common network node, and typically includes many or all of the elements described relative to the personal computer **20**, although only a memory storage device **50** has
 5 been illustrated in FIG. 1. The logical connections depicted in FIG. 1 include a local area network (LAN) **51** and a wide area network (WAN) **52**. Such networking environments are commonplace in offices, enterprise-wide computer networks, Intranets and the Internet.

When used in a LAN networking environment, the personal
 10 computer **20** is connected to the LAN **51** through a network interface **53**. When used in a WAN networking environment, the personal computer **20** typically includes a modem **54** or other means for establishing communications over the WAN **52**, such as the Internet. The modem **54**, which may be internal or external, is connected to the system bus **23** via
 15 the serial port interface **46**. In a networked environment, program modules depicted relative to the personal computer **20**, or portions thereof, may be stored in the remote memory storage device. It will be appreciated that the network connections shown are exemplary and other means of establishing a communications link between the computers
 20 may be used.

Exemplary Embodiments of the Invention

FIG. 2 is an illustration of an HTML file **200** showing the HTML
 25 file structure. The HTML file **200** contains a header portion **205** and a content portion **210**. The header portion **205** typically contains information regarding the management of the file, such as the name of the file, the size of the file, the time and date that the file was created, and the address of where the file is located.

The content portion **210** contains the HTML tag **215**, which indicates the beginning of the HTML document, which in turn includes a HEAD tag **225** and a BODY tag **240**. The BODY tag **240** contains a plurality of object data, which are enclosed in angle brackets ('<' and
 5 '>'), known as tags. The tags indicate the structure and the format of the object data that are displayed in the HTML document.

The HTML tag **215** contains a namespace **220** whenever at least one of the data objects in the content portion **210** is stored at an alternative site. Typically the alternative site will be an electronic file
 10 stored at a remote server. However, the alternative site may also be a separate file stored on a local hard drive, a remote hard drive or any other file separate from the HTML document stored in a memory device.

One implementation of the redirection attribute will be used in the generation of a Web Query by a user who imports data from a Web page
 15 and analyzes the imported data in a spreadsheet program, such as the MICROSOFT EXCEL spreadsheet program. When the end-user imports tabular data from an HTML document displayed in a Web browser program into the MICROSOFT EXCEL spreadsheet program, the MICROSOFT EXCEL spreadsheet program is redirected to an alternative
 20 site where the underlying data associated with the data object is stored in a rich XML source. It should be noted that other data objects, such as text, video files, and audio files may be imported into other application programs, such as presentation programs, word-processing programs, and the like using the redirection tag **215** without departing from the scope of
 25 the invention.

The redirection attribute is created by the Web author and may be placed anywhere within the HTML document **200**. For the example of creating a Web Query, Web authors must create a MICROSOFT OFFICE program namespace declaration **220** in the <HTML> tag **215**.

Specifically, in order to supply the redirection tag for Web Queries, Web authors insert an additional declaration in the HTML tag **215** of the HTML document **200** of the form:

5 <HTML xmlns:o= "urn:schemas-microsoft-com:office:office">

The HTML tag **215** initializes an operator "o" that defines a uniform resource name ("URN") that in turn defines the namespace declaration, which in this example is "schemas-microsoft-com:office:office."

10 The <BODY> tag **240** also contains several object tags, one of which is a <TABLE> tag **245**. The <TABLE> tag **245** contains a redirection attribute **250** that is associated with a <TABLE> tag **245**. The redirection attribute **250** contains a connection string, which provides an address to the location of the underlying data. In the above example of
15 supplying the redirection tag to a Web Query, the HTML document author must insert the following redirection attribute to the TABLE tag:

<TABLE ... o:WebQuerySourceHref="http://...>

20 which indicates the uniform resource locator (URL) of the underlying data. In this illustration, the redirection attribute **250** is given within the context of a <TABLE> tag **250**. This is due to the fact that creating a Web Query requires tabular data. It should be noted that the redirection attribute **245** may be given in the context of a PRE, XMP, PLAINTEXT
25 or LISTING tag because each one of these tags are capable of containing tabular data.

The redirection attribute **250** contains the URL of the Web site containing the underlying data. Therefore, whenever a user selects the data object associated with the <TABLE> tag **245** to create a Web Query,

the URL indicates to the MICROSOFT EXCEL spreadsheet program where the data exists. The operation of redirecting the MICROSOFT EXCEL spreadsheet program to the alternative file location is transparent to the user, who believes that the data is being retrieved from the HTML document and not from the alternative file location.

FIG. 3 is a screen shot of a dialog box that is used to disable the redirection attribute. The illustration specifically shows a Web Query Options dialog box **300** in the MICROSOFT EXCEL spreadsheet program that allows the user to disable the redirection attribute when creating a Web Query. The Web Query Options dialog box **300** contains formatting settings **305**, import settings for preformatted <PRE> blocks **310** and an area **315** that allows users to disable features of the Web Query including a “Disable Web query redirection” check box **320**. The “Disable Web query redirection” checkbox **320** is unchecked by default.

However, when the “Disable Web query redirection” check box **320** is selected, a redirection flag is set to a specified value. The redirection flag is a Web Query table property and therefore, is saved with the MICROSOFT EXCEL spreadsheet file. The specified value that the redirection flag may be set to is selected from two Boolean values “TRUE” or “FALSE.” When the redirection flag is set to the Boolean value “TRUE,” the redirection attribute is ignored and the tabular data displayed in the HTML document, rather than the underlying data stored at the alternative location, is imported into the Web Query. Conversely, when the redirection flag is set to the Boolean value “FALSE,” the redirection attribute is used to “direct” the MICROSOFT EXCEL spreadsheet program to the alternative file location to retrieve the underlying data associated with the selected tabular data.

FIG. 4 is a logic flow diagram of routine **400** for a method for redirecting an application to the alternative location that contains the

underlying data of a data object displayed in the HTML document. The discussion of routine **400** is specifically directed toward redirecting the source of a Web Query in the MICROSOFT EXCEL spreadsheet program. However, those skilled in the art will appreciate that the redirection attribute can be applied to other application programs, such as word processing or desktop publishing without departing from the scope of the invention.

Routine **400** begins at step **405**, in which a user command is received selecting at least one data object to import into the MICROSOFT EXCEL spreadsheet program. Step **405** is followed by step **410**, in which the determination is made whether more than one instance of an HTML data object, such as tabular data, is selected in the Web page to import into the application program. If more than one instance of tabular data is selected, the “YES” branch is followed to step **440**, in which the application program retrieves the data object directly from the HTML document and imports the data object in HTML format. The application program can still operate on the HTML data object. However, because the HTML data object is formatted as HTML, the application may misinterpret the data in attempting to operate on it depending on the nature of the data and the nature of the application program. For example, if the data object in the HTML document contains the character string “45,” the application program may misinterpret the data. The number “45” may be an integer value representing the number of shares purchased by an individual or it may really be the price per share of a stock the user is interested in researching. Because HTML does not allow this type of extra information to be stored within the HTML data object, it is interpreted as a character string. However, if the data object is imported into the MICROSOFT EXCEL spreadsheet program, the character string will be

treated differently if it is interpreted as an integer value than if it is interpreted as a monetary value, which may lead to a result that is different from what the user expects. Step 440 is then followed by the “END” step.

5 However, if the determination is made at step 410 that the only a single HTML data object was selected to be imported into the application program, the “NO” branch is followed to step 415. At step 415, the application program retrieves an HTML data object tag associated with the HTML data object to be imported. In the case of a Web Query, the data object tag will typically be a <TABLE> tag. However other tags such as <XMP>, <LISTING>, <PLAINTEXT>, <PRE>, and any other tags that are capable of storing tabular data may be retrieved. Once the HTML data object tag is retrieved, routine 400 proceeds to step 420, in which the determination is made whether the HTML data object tag contains a redirection attribute. If the HTML data object tag contains a redirection attribute, the “YES” branch is followed to step 425. At step 425, a second determination is made whether the Web Query redirection tag has been disabled. If the Web Query redirection tag has not been disabled, then the “NO” branch is followed to step 430, in which the MICROSOFT EXCEL spreadsheet program retrieves a connection string associated with the redirection attribute. The connection string contains the address of the file that contains the HTML data object. Typically the connection string is a uniform resource locator (URL) of the alternative source file where the underlying data is stored. However, those skilled in the art will appreciate that the connection string may be a directory listing on a network or a local hard drive that points to where the underlying data is stored. The MICROSOFT EXCEL spreadsheet program then opens the alternative site associated with the connection string so that the underlying data may be accessed.

Step **430** is followed by step **435**, in which the application program retrieves the underlying data associated with the HTML data object displayed in the Web page and imports the underlying data source into the application program. Typically, the underlying data source will be stored in a different format than the HTML data object displayed in the Web page. For instance, suppose the user wants to create a Web Query by importing tabular data displayed in the Web page. Typically, the tabular data in the Web page is stored in HTML format, which is optimized for displaying HTML data objects. However, the underlying data associated with the tabular data may be stored in a different, rich format, such as XML that is optimized for data semantics. Therefore, it is much more advantageous for the application program to operate on the underlying data source rather than the tabular data displayed in the Web page because the rich format of the underlying data source will allow the application program to provide the user with a more meaningful result. As a specific example, suppose a user wishes to import an HTML data object from a Web page into the MICROSOFT EXCEL spreadsheet program that contains the character string "9-6-00." The MICROSOFT EXCEL spreadsheet program would be unable to determine whether the character string represented a date, a number, or a combination because the character string is formatted as HTML. However, if the MICROSOFT EXCEL spreadsheet program retrieved the underlying data source associated with the character string, the data semantics of the character string could be determined due to the underlying data source being stored in a rich text format, such as XML. The rich text format of the underlying data source allows the MICROSOFT EXCEL spreadsheet program to properly interpret the character string and provide the user with the results that they expect. Step **435** is then followed by the "END" step.

Returning to step **425**, if the determination is made that the redirection flag is disabled, then the “YES” branch is followed to step **440**, in which the application program retrieves the HTML data object directly from the Web page and imports the HTML data object in HTML format. The application program can still operate on the HTML data object. However, because the HTML data object is formatted in HTML and not in a rich text format, the application program may misinterpret the data when attempting to operate on the imported HTML data object. Depending on the nature of the HTML data object and the nature of the application program, after operating on the imported HTML data object the application program may return results that are different than what the user expected.

The present invention thus provides a method for Web authors to include redirection tags associated with HTML data objects display on a Web page. The redirection tag is used when a user attempts to import an HTML object into an application program by redirecting the application program to an alternative source file where the underlying data associated with the imported HTML data object is stored in an alternative file format.

It should be understood that the foregoing pertains only to the exemplary embodiments of the present invention, and that numerous changes may be made to the embodiments described herein without departing from the spirit and scope of the invention.